AGRICULTURAL
Research
U.S. DEPARTMENT OF AGRICULTURE

JUNE 1971

AGRICULTURAL
Research

June 1971/Vol. 19, No. 12

Gift of Green

The green leaf governs the economy of nature. Every living creature, with minor exceptions, is utterly dependent upon plants and photosynthesis. Powered by sunlight, the chlorophyll in leaves turns carbon dioxide and water into the sugar that ultimately nourishes all life.

Modern science, with its great discoveries, stands humbled by the awesome food-producing ability of the plant kingdom. Certainly no single chemical reaction is more vital to man than photosynthesis. Every year plants take some 200 billion tons of carbon released by decaying wastes and transform it into plant material, and in the process recharge the biosphere with life-sustaining oxygen. As partakers of these benefits we should always remember that, biologically speaking, we are plant parasites—although we have long been co-tenants of the earth, plants existed before man and need him not at all. The earthly realities are that man cannot really hold dominion but must live in harmony with the natural world.

Many of our activities adversely affect the well-being of plants. It is a perverse paradox that we damage plant life most where we need it most, around our burgeoning population centers. We can alleviate much of this damage through an awareness of the interdependencies that make up the unity of life and acting accordingly. The building of homes and roads without regard to drainage patterns, for example, can drown nearby plant communities. Once construction is completed, the tramp of feet and the roll of traffic, often on seemingly invulnerable sites, can exact a heavy toll of plant life by compacting the soil, thereby lessening its capacity to harbor water and air. Every winter, tons of salt are spread on streets and highways, polluting the water supply of many plants and eventually killing them because their roots cannot take up salt water.

Even the mundane trappings of modern life do their share of damage. Air conditioners emit strong drafts that can rob cells of their turgidity, thus drying off the plant. And kitchen fans propel cooking fats and oils outdoors where they clog leaf surfaces and interfere with plant respiration.

Nature's power of renewal heals many abuses. Even so, the quality of human life would gain if we realized that man lives because he is surrounded by plants. We can create harmony between man and nature by practicing the kind of stewardship exemplified by French farmers who live in graceful villages amid ever fertile fields tilled well over 4,000 years. The gift of green can be managed with wisdom and knowledge.

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COVER: Operation Hog Cholera (page 7). Specially trained veterinarians examined more than 500 herds where sickness was found by survey teams or herd owners in the Dismal Swamp area. Tonsil biopsy was an important tool (0970C899–3).

AGRICULTURAL RESEARCH is published monthly by the Agricultural Research Service (ARS), U.S. Department of Agriculture, Washington, D.C. 20250. Printing approved by the Bureau of the Budget, June 1967. Yearly subscription rate is $1.50 in the United States and countries of the Postal Union, $2.00 elsewhere. Single copies are 15 cents. Send subscription orders to Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

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SUNFLOWERS: next wonder crop?

TO BIRD LOVERS, the sunflower means seed for winter feeding; to Midwesterners. the roadside flower that turns its head to meet the rising sun; to Russians, the crop that produces over 2 billion tons of oil a year. A recent discovery, however, will undoubtedly alter the image of this New World plant in its native land.

The sunflower as a crop plant in the United States has mainly been grown in the North Central States. And it has been vexed by varieties that vary in height and maturity. The missing ingredient for breeding hybrid sunflowers, which would solve these problems, has been a gene to restore fertility to male-sterile plants. That gene, called a restorer gene, has been found by Dr. Murray L. Kinman, ARS agronomist, working in cooperation with the Texas Agricultural Experiment Station, College Station.

It will now be possible to breed hybrid sunflowers of consistent high quality with good yield and high oil content, much in the same way that hybrid corn is bred. Research results indicate that hybrids may yield 30 percent more than the old inbred varieties and will be uniform in maturity and height, thus simplifying culture and harvesting of the crop.

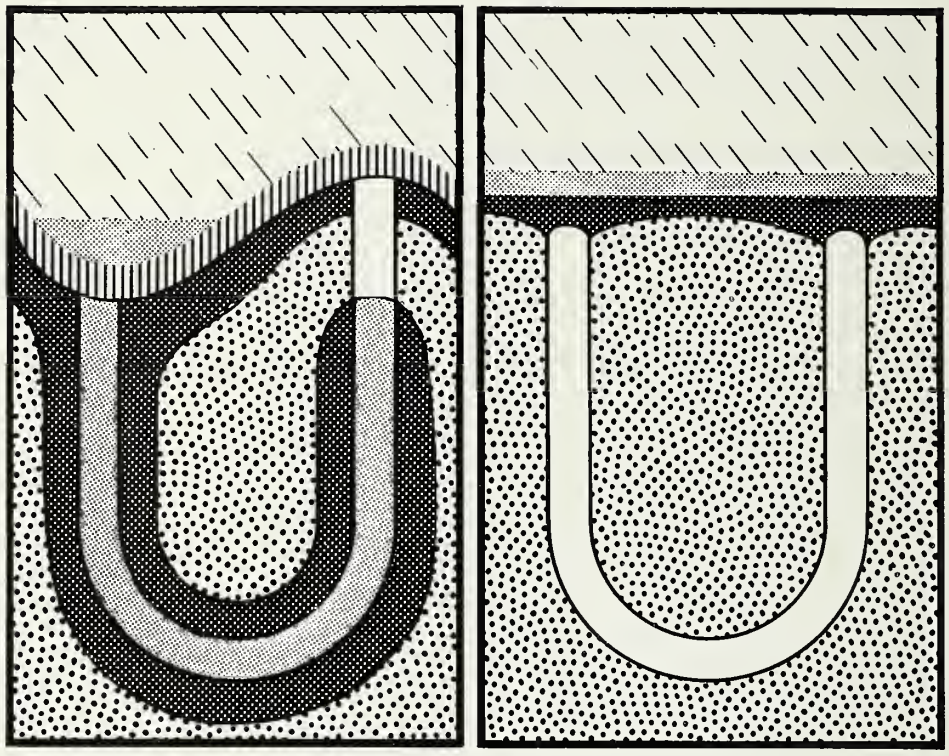
The agricultural sunflower, a versatile, hardy plant, is more widely adapted to extremes of climate than are corn or soybeans. It does particularly well where soil and climate favor corn.

In time, the sunflower could well become an important alternate cash crop in the South, because control of the sunflower head moth is now possible. Also, the decreased demand for cotton has created a need for a new crop for cotton growers, as well as an alternate use for cotton processing equipment. The hybrid sunflower is an excellent candidate.

In the North, sunflowers could become a crop of considerable importance as a replacement for flax. The market for flaxseed (linsced oil) has declined so greatly that production substantially exceeds consumption. Because linsced oil is used primarily in industry, sunflower oil, which is both edible and industrial, has a greater potential in American agriculture.

The genetic advance of Dr. Kinman was the final step in wresting control of sunflower breeding from the vagaries of bees and wind and putting it into the hands of breeders. ▪

Diagrams contrast infiltration of rain water by the two extreme soil channel states. State A has a rough, mulch-covered surface with open pores that permit the air to escape as water seeps down. State F has a bare, flat surface with closed pores containing trapped air. Some air must escape before water can infiltrate (PN–1958).



CHANNEL SYSTEM:

new concept of water infiltration in soils

LARGE SOIL PORES or channels common in most soils, as well as the pressure of air in the soil, profoundly affect both the rate and route of water infiltration.

This knowledge led an ARS researcher to develop a channel system concept of infiltration that may provide practical control for many problems dealing with soil water such as runoff, distribution, drainage, pollution, and leaching. The concept has potential use in the management of cropland, forests, rangelands, and other land areas.

In explaining this concept, ARS soil scientist Robert M. Dixon of Reno, Nev., says the soil surface may be viewed as a valve that regulates fluid flow within the large pores. The soil surface condition corresponds to different settings of the valve. Important to this concept is that large soil pores provide a means of exhausting soil air displaced from the soil mass by water. They also act as a subterranean arterial system for rapidly distributing free surface water to locations within this mass.

Dr. Dixon's concept groups soil pores by origin and size into two systems, the channel system and the capillary system, which might be likened to the human body's arterial and capillary systems. The channel system includes the soil surface and its subsurface extensions in the form of large pores or channels. The capillary system includes the smaller textural and structural pores which surround the channels.

Specifically, the channel system includes minute topographical features and large pores produced by clay shrinkage, tillage, earthworms, ants, roots, eluviation, ice crystals, pebble dissolution, and entrapped air. In contrast, the capillary system is composed of small pores within and between individual soil aggregates. One of the major roles of the channel system is distributing water to the capillary system for storage and later use by plants.

Controlling this distribution are six different channel system states. These states differ only at the surface, and cultural practices can be designed to achieve the desired state.

States A, B, and C are rough-surfaced. State A has open water intake and air exhaust pores; B has unstable pores; and C, closed pores. States D, E, and F are smooth-surfaced with D having open pores; E, unstable; and F, closed. The infiltration rate between States A and F can differ by more than 10 times.

State A is a well-developed system that rapidly transmits and distributes water to the subsurface borders of the capillary system and readily exhausts displaced air. To achieve these conditions, the soil surface must be rough (furrowed) and covered as in stover- and stubble-mulch tillage. The roughness provides minute depressions for water intake and minute elevations for air exhaust, and these are stabilized by the cover.

State F, on the other hand, is smooth-surfaced, and the lack of roughness profoundly affects channel and capillary system water and air movement. A thin layer of free water accumulates on the surface; hence there are no optimal sites for intake or exhaust.

Dr. Dixon, who was joined in the study by University of Wisconsin soil scientist Arthur E. Peterson, says that the channel system concept can be used to control water penetration rates and routes. It appears to be valid for a wide range of soil textures and for all soil water sources producing free surface water. ▪

Device cuts research costs/CABBAGE LOOPERS

ONE OF THE MAJOR COSTS in rearing cabbage loopers for sterilization may have been cut considerably with the development of a mechanical aid for sorting male and female pupae.

Previously, an operator had to manually position papae under a microscope to view the size and shape of the genital pads in determining sex. Operators could sort about 1,000 an hour for only 2 or 3 hours before they got tired. With the new mechanical aid, trained operators have been able to sort up to 2,000 per hour.

Sterilizing male cabbage loopers and releasing them to help control the native population is part of a continuing ARS program to develop safe and more effective pest control methods. Male looper moths, sterilized by radioactive cobalt, retain their normal mating instincts, but any eggs produced by matings are infertile. There's no threat to cabbage crops or to man, and the moths are not radioactive.

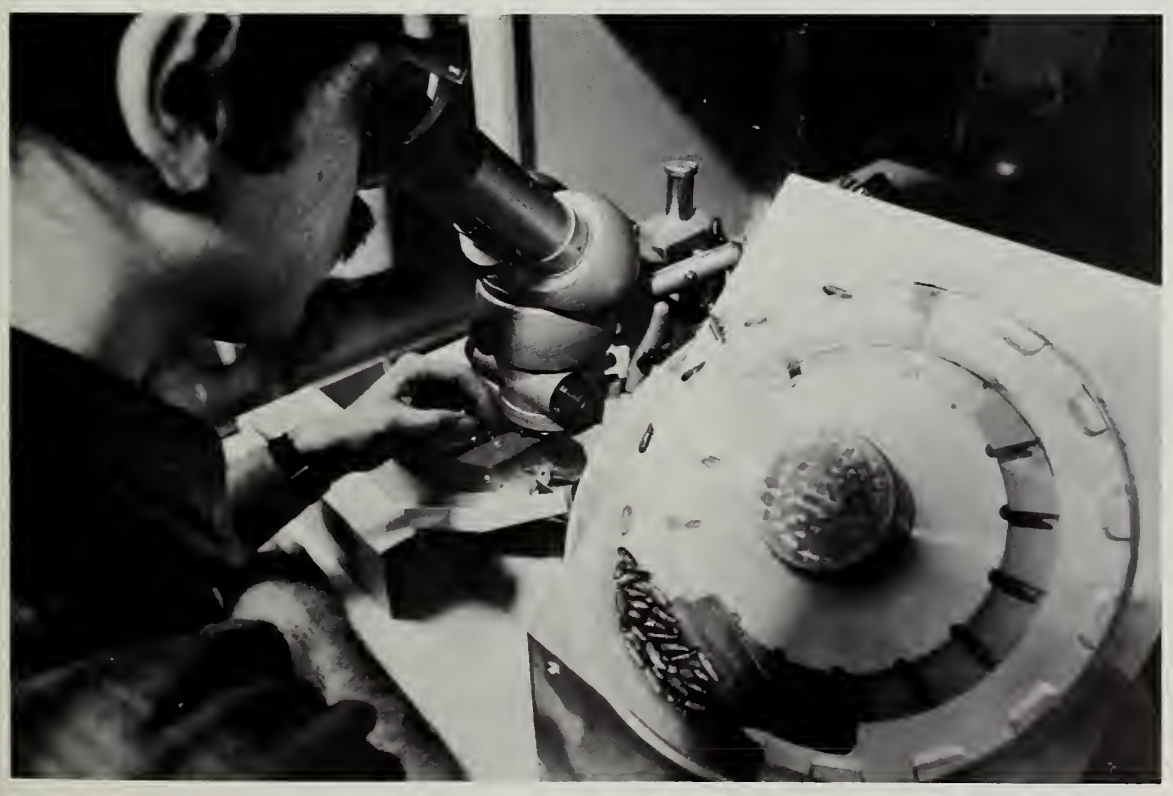
Agricultural engineer Wayne W. Wolf and entomologist Michael W. Stimann, both of ARS at Riverside, Calif., developed the mechanical aid in cooperation with the California Agricultural Experiment Station. Much of the mechanization of sorting pupae posed no great problem, but the positioning of the pupae under the microscope did. The target area is small, and the pupae must be positioned properly for the operator to view the pads.

In the new method, a round, slotted acrylic plate picks up pupae from a hopper and drops them into slots in a lower plate. While the pupae are in the lower plate, they move over a groove. If the head of the pupa is down, it passes over the groove and is ready to be positioned under the microscope, head-first. If the tail is down, it drops into the groove which diverts it to one side of a stationary cam. As the pupa continues to move, with the tail on one side of the cam and the head on the other, the weight of the head flips the pupa so that the tail is up and ready to slide head-first onto two rotating rods under the microscope. It's like a child tripping head-first over a fence.

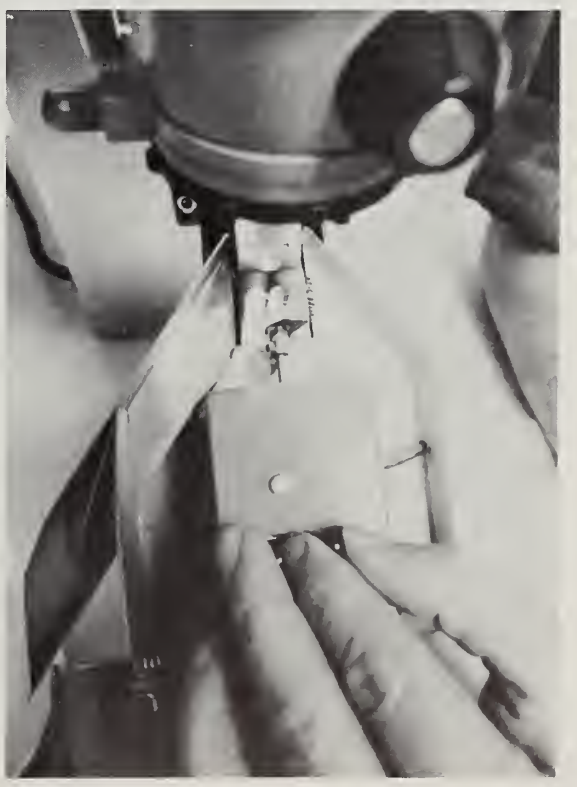
The rotating rods continuously turn the pupa while the operator identifies the sex. The operator then activates a brush that sweeps it off the rods into containers for male or female pupae. Each time the operator sweeps a pupa off the rollers, the feed plates start rotating, a new pupa slides into view, and a photocell stops the feed plates when the next pupa is ready to slide onto the rollers.

This mechanism may lead to a completely automatic device to sex large numbers of pupae for release. ▪

As disk revolves, pupae drop one by one through slots into a lower plate where they are positioned. Dr. Stiman's left hand is on brush that will send pupae to proper box (371X214–34).



After pupae are sexed, they are swept off rollers to the right or left depending on sex (371X214–49).



Quick test for seed fungicide

A NEW TEST quickly determines how well individual seeds are coated with captan, a widely-used fungicide. This could formerly be assayed only by a time-consuming test that was impractical for routine use.

As a service to farmers and gardeners, official seed-testing agencies could use the new test to determine quickly and inexpensively if the captan listed on seed labels had been applied adequately. Seed firms could apply the test to check the precision of fungicide treatments—whether seeds had been coated with too little fungicide or too much. Overtreatment adds to the firm's operating costs and may even kill the seeds.

The test is adapted from a resorcinol method that, although accurate, is too time-consuming for routine use on individual seeds. The new test is rapid enough to handle 300 seeds daily—a quantity that would take weeks to test with the standard resorcinol method. The test employs inexpensive equipment and can be performed by a technician after minimum training.

ARS technician Paul W. Simon and plant pathologist Martin M. Kulik developed the new test at Beltsville, Md. They obtained good results with 100 sorghum seeds from each of 11 commercially treated samples. This test can also be used on corn, cotton, soybeans, and other kinds of seeds.

An important feature of the Beltsville test is its ability to readily remove the dye from captan. Under the law, treated seeds must be dyed as a warning against use for feed. But the dye interferes with the color reaction that indicates the quantity of captan present.

In short, the fungicide is removed with benzene, and the dye is removed by pouring the extracted fungicide through a cigarette filter treated with an absorbent which traps the dye. After following procedures developed by Mr. Simon and Dr. Kulik, the fungicide extract is placed in a colorimeter—a device that measures the intensity of the extract's color. The deeper the color, the greater the amount of fungicide on the seed. The reading on the colorimeter dial is converted to amount of fungicide by referring to a chart.

The test showed a wide range in seed coverage by captan in commercially treated sorghum seeds. Some seeds had about three times more fungicide coating than did other seeds. Closer control of seed treatments could be maintained by seedsmen with the aid of the new test. ■

Dr. Kulik examines benzene extracts of captan that were poured through absorbent cotton in the dye-removal tubes (371A230–11).

Left: *Survey work was the heart of the Dismal Swamp operation. Teams checked and rechecked more than 300,000 animals for hog cholera in some 4,000 swine herds (0970C897–1).*

Below: *Morning autopsy of a suspect hog performed in the field revealed button ulcers in the large intestine, a common sign of hog cholera. By noon, the veterinarian was racing to the laboratory for confirmatory tests. Speed is vital because each infected hog is a virus factory, multiplying chances for disease spread (BN–37551).*

OPERATION HOG CHOLERA

Posters displayed throughout the area helped alert farmers to the hog cholera quarantine and eradication effort (970C890–1).

A SMALL "ARMY" of hog cholera fighters recruited from around the country converged on the Dismal Swamp region last fall. Their mission: Wipe out a persistent infestation straddling the Virginia-North Carolina border.

It was hard work with many miles of farm-to-farm travel to check and recheck every swine herd. The job required top professional skills, speed, precision, and tact in dealing with the owners of condemned hogs.

When the mission was over, the 175-man task force had sought out 68 infected or exposed herds, and destroyed

Above: *Specimens from morning field autopsy are logged in at State diagnostic laboratory. By midafternoon, lab report was back—positive (970C889–3).*

Below: *Immediately notified of positive report, official begins appraisal of affected herd to determine amount of indemnity to the owner (970C890–20).*

and promptly disposed of some 12,000 infected animals. A small surveillance force still guards against any latent flareups.

This successful effort marks a turning point in hog cholera eradication. A task force approach was not feasible as long as outbreaks were sprinkled over the U.S. map. But progress in the national eradication program had so reduced the incidence of hog cholera that it was now possible to mount an all-out attack in a specific problem area.

During the 4 months just before the task force effort got underway, these two States accounted for over half of the cases reported nationally. Although Virginia and North Carolina worked hard at eradication, their resources were too limited to get ahead of the disease and to stamp out persistent pockets of infestation. ARS formed the task force in response to the States' request for help, staffing it with veterinarians and livestock inspectors drawn from 40 States.

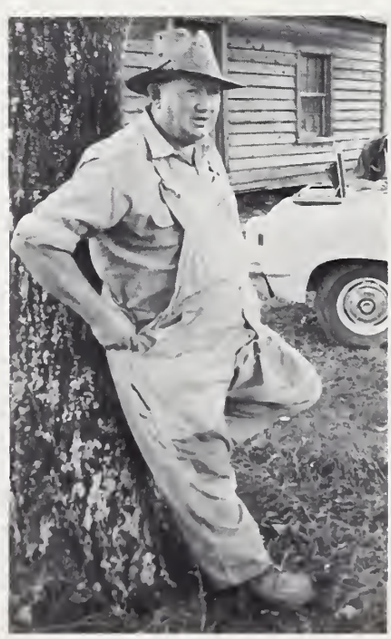
Besides wiping out this persistent outbreak, the 11-week-long campaign provided valuable experience in emergency eradication procedures, not only for hog cholera but other livestock diseases as well. ▪

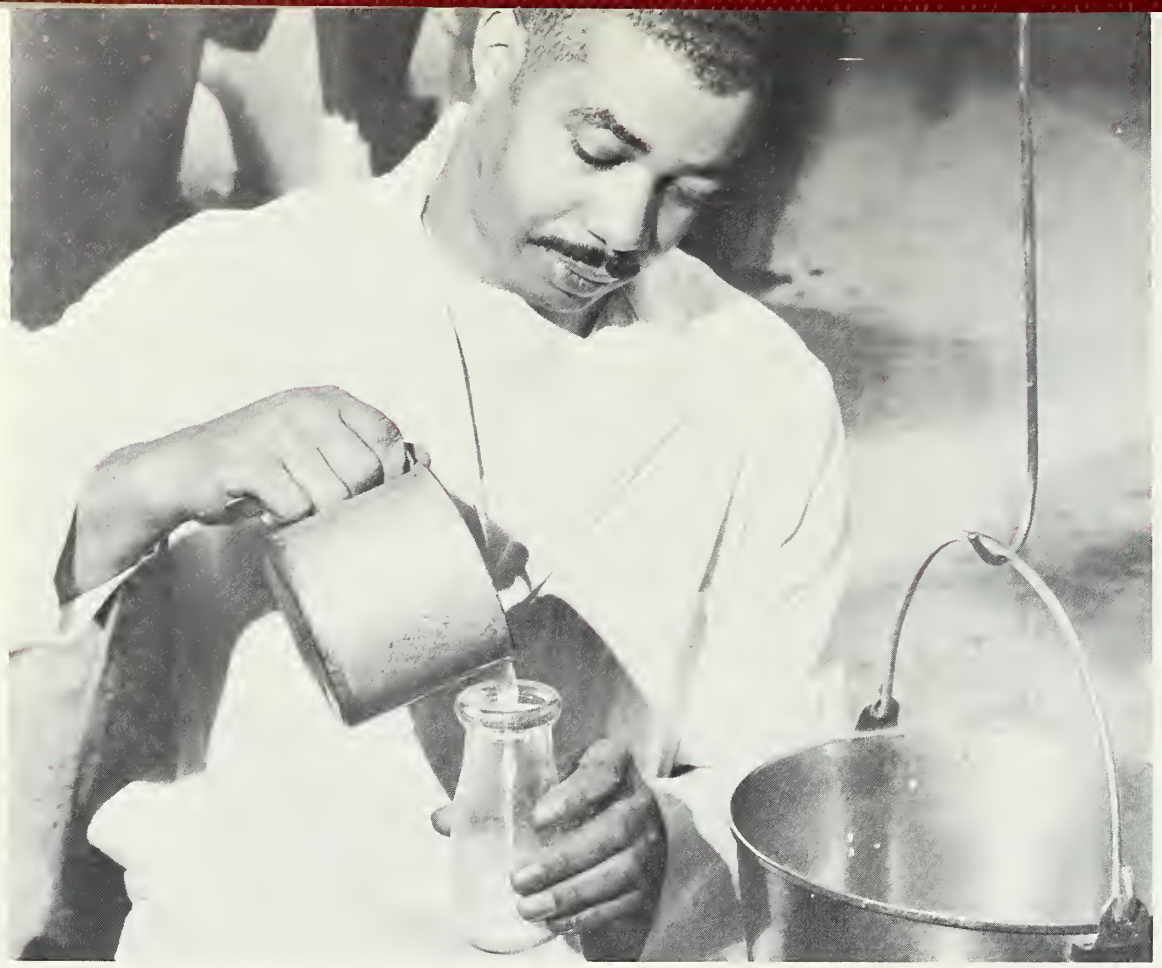
Left: *Early the next day, a crew moves in to destroy the herd. This is done efficiently and humanely by injecting a lethal drug called succynilcholine chloride. Official uses a safety syringe with the aid of a veterinarian who stands by as a precaution against accidents (0970C896–15).*

Below: *That afternoon, the dead animals are dumped into a deep trench, covered with lime, and buried. Some herds are trucked to rendering plants where the hog cholera virus is killed during processing (970C892–6).*

Bottom left: *All equipment used is cleaned and disinfected. Boots are also disinfected when entering or leaving a farm, and coveralls are changed for each visit (970C893–5).*

That evening, the farmer contemplates his situation. Sometimes, money can't cover loss of time and other intangibles (970C890–32).





Mr. Marrow obtains a milk sample for analysis each morning after cows have been milked (271X112–3).

Decontaminating dairy cows

WHAT CAN WE DO when a dairy cow accidentally eats forage grown on recently sprayed fields or when she consumes feeds from fields with a history of heavy pesticide use?

Until recently, milk from contaminated cows had to be withheld from the market for a year until it met Food and Drug Administration tolerance levels. But laboratory tests and trials in commercial dairy herds by the Michigan Agricultural Experiment Station showed that dieldrin-contaminated milk from cows fed activated charcoal and the barbituate, phenobarbital, could meet FDA tolerance levels in about half the time. This was extremely important to dairymen since it meant income would be coming in that much sooner.

Carrying this finding one step further, ARS dairy nutritionist George F. Fries recently led investigations at Beltsville, Md., to find out whether both charcoal and phenobarbital were necessary. He was also interested in the extent to which this approach could be used with other pesticides such as DDT. Assisting Dr. Fries on this project were dairy nutritionists Chester H. Gordon, Leslie P. Dryden, and Arthur M. Hartman, and technicians George S. Marrow and James W. Lester.

The researchers ran a series of experiments on rats and cows contaminated with dieldrin and several forms of DDT, and treated with various forms of activated charcoal and barbituates. Here are some of their findings:

- Charcoal decreased retention of DDT in rats by 61 percent when fed with contaminated feed. It had no effect when fed for 14 days after contaminated feeding stopped.
- Charcoal had no effect on cows contaminated with DDT, DDE (a persistent metabolite of DDT), or dieldrin when fed for 26 days beginning 14 days after contamination.
- Sodium pentobarbital had no effect on retention of dieldrin or DDT, but worked on DDD when fed 20 days starting 14 days after contamination.
- Sodium phenobarbital shortened the time of return to tolerance limit by about 50 percent when fed after dieldrin contamination and by 25 percent after DDE contamination.
- Diphenylhydantoin, which reduces DDT retention in humans, was not effective in reducing DDT levels in cows.

Milk production and feed consumption were not affected by the drug treatments in any of the experiments. No ill effects from the drugs were noted.

The researchers conclude that results of the Michigan research testing charcoal plus phenobarbital on dieldrin retention would have been about the same with phenobarbital alone. Activated charcoal, however, might be useful in acute poisoning cases to immediately reduce pesticide retention.

The treatments cannot be considered economic remedies to compensate for feeding contaminated forage to uncontaminated cows. Charcoal treatments, for example, cost 50 cents a day per cow, and uncontaminated feed can be purchased for that cost. ■

Dr. Fries pours sodium phenobarbital mixed with a small amount of feed into the rest of the ration (271X112–12).

New lamb products

LAMB ranks at the bottom of the list in yearly per capita consumption of meats, but new lamb and mutton products may lead the way to greater consumer acceptance.

The new products are lamb curry and rice, sausage, lamb loaf, shanks and rice, rolled stuffed breast, and riblets—all of which are either frozen or refrigerated. They were developed and tested under a contract awarded by the ARS Eastern marketing and nutrition research laboratory, Philadelphia, Pa., to The Pennsylvania State University, University Park, Pa. ARS chemist William L. Sulzbacher administered the contract, with the American Lamb Council cooperating in the research.

In two preliminary tests with students in a college cafeteria and with housewives, curry and rice, sausage, and loaf were the most widely accepted and showed the most promise for future market tests. All the products were rated as excellent by a large wholesaler of prepared foods.

Curry and rice, the traditional lamb dish, was the most readily accepted product. It was packaged in boil-in-bag containers for the housewives, who appreciated the convenience, but it was served over rice in the students' cafeteria.

A tomato base sauce was developed for use with the shanks and rice, riblets, and the rolled, stuffed breast. The shanks, which were marinated and cooked in the tomato sauce and served over rice, were preferred to the riblets and breast by both students and housewives.

Further tests are planned in which the new products are actually placed in markets, and consumer acceptance is evaluated. ▪

Good management means more calves

CALF LOSSES at, or just after, birth rank second only to conception failure as the chief factor in beef calf crop reduction, but animal scientists have tracked down some possible causes and cures.

In a 10-year project at the U.S. Range Livestock Experiment Station, Miles City, Mont., ARS beef physiologist Robert A. Bellows studied a total of 6,409 calvings. Out of 380 calf losses, 75 percent occurred at birth; the remainder, between birth and weaning.

Of the losses at birth, 58 percent of the calves were normal and born alive. Birth difficulties caused the deaths, leading Dr. Bellows to conclude that most of these losses could have been prevented with improved management; notably, closer observation and more help for the cow during calving.

During the first 6 years of the study, cows calved under range conditions—in large areas with few receiving any assistance during calving. Losses were 9.5 percent for first-calf, 3-year-old heifers, 4.3 percent for 4-year-old cows, and 2.4 percent from cows that were 5 or more years old.

In contrast, during the last 4 years of the study, cows were held in smaller areas during the calving season. Heifers were held separately in pastures or feedlots and were observed 24 hours daily throughout calving.

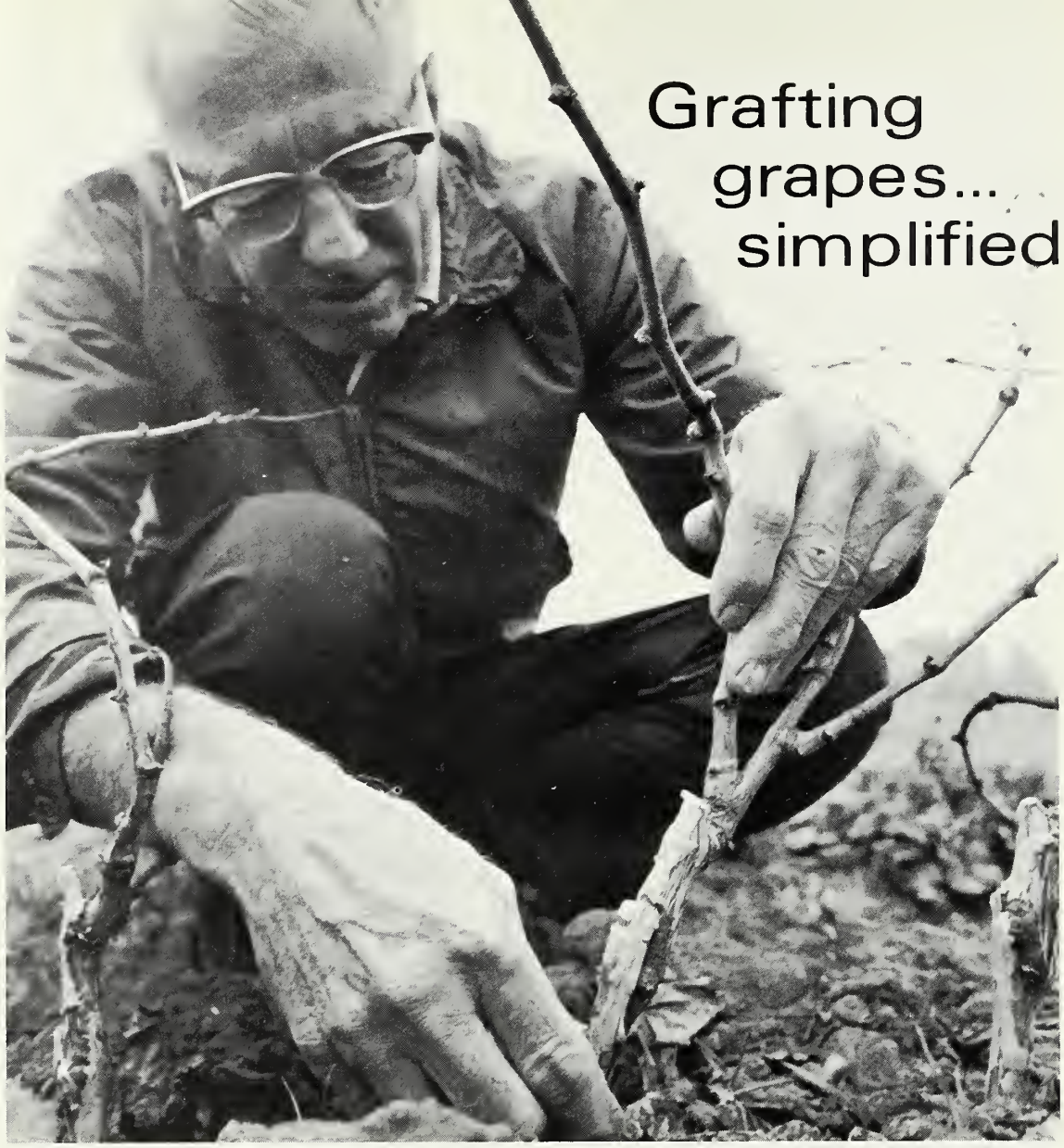
Losses were reduced to 6.4 percent among first-calf, 3-year-old heifers. Moreover, only 4.3 percent of calves from first-calf, 2-year-old heifers were lost. So calf losses occurring in the problem age group can be reduced through the use of sound management practices.

In a separate study of various causes of calving difficulties in 2-year-old Angus and Hereford heifers, these factors ranked as most important: birth weight of calf and pelvic area of the dam in both Angus and Hereford, precalving weight of dam in Angus only, and sex of calf in Herefords only. ▪

Out of a total of 6,409 calvings, 285 calves were lost at birth. The calf losses were classified as follows:

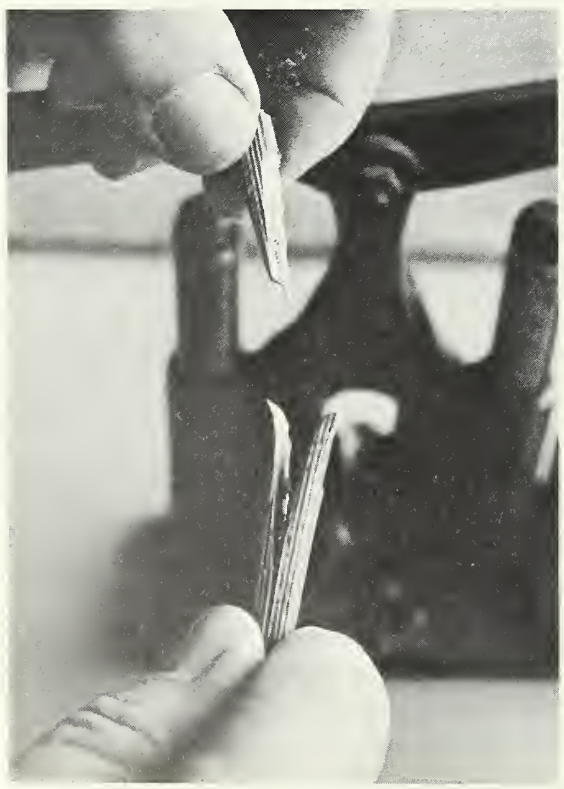
	Number	Relative percent
Sex:		
Male	167	58.6
Female	118	41.4
Anatomy:		
Normal	205	71.9
Abnormal	80	28.1
Lung status of normal calves:		
Functional	79	38.5
Nonfunctional	117	57.1
Unknown	9	4.1

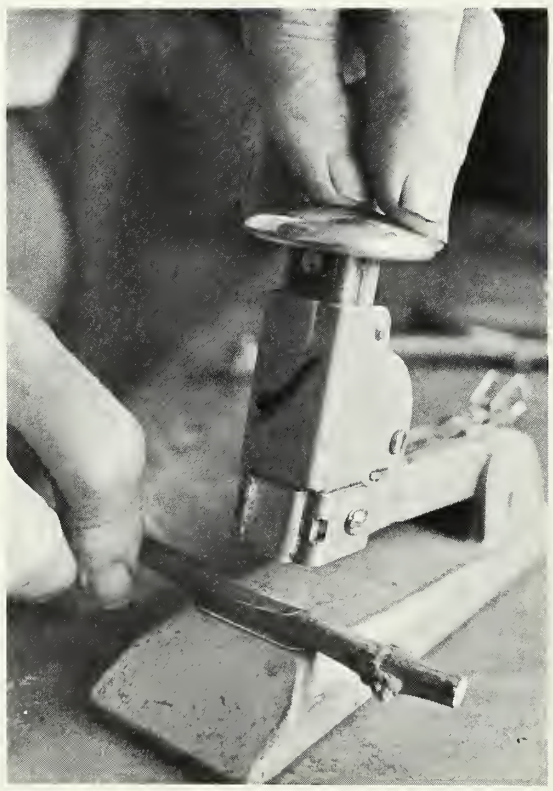
Grafting grapes... simplified



Mr. Loomis examines grafted rootstock planted in the field the previous year. Paraffin usually begins to crack after a few weeks and is sloughed off as the vine grows (371X217–11).

Scion portion above and rootstock below are cut for fitting (371X217–40) and then stapled together. Bud on scion portion will grow into the new producing vine (371X217–41).





SIMPLIFIED grafting procedures may enable nurseries to cut the price of grafted grapevines in half.

Grafting is practiced in vineyards mainly to combat soil pests that attack and destroy the roots of selected, high-quality grape varieties. If grapevines were bred for root resistance to soil pests, the unique fruit qualities of the thousands of specialized varieties would also be changed, destroying centuries of breeding. Fine, distinct wine varieties would not taste the same, nor would raisins, jellies, or table grapes. The answer, of course, is grafting—joining the unique fruit-bearing vines to rootstocks bred for pest resistance and for suitability to various soils—an expensive but necessary operation.

In an effort to reduce the propagating costs of grafted vines, Horace Loomis and John H. Weinberger, ARS horticulturists at the U.S. Horticultural Field Station, Fresno, Calif., developed several successful innovations.

Using Harmony rootstock, which has good soil pest resistance and which bench-grafts and roots readily, Mr. Loomis and Dr. Weinberger disbudded the rootstock cuttings early in January and placed them in water overnight. They were then whip-and-tongue grafted to Thompson seedless grape scions. A scion is that portion of the vine which will grow above ground and bear fruit.

To provide a close-fitting and strong union, the researchers did not hand-tie the cut ends of rootstock and scion—they stapled the ends together with an ordinary paper stapler. The grafts were then packed in boxes of damp peatmoss and loosely enclosed in plastic bags where they were held for 3 weeks at room temperature for the unions to form callus tissue.

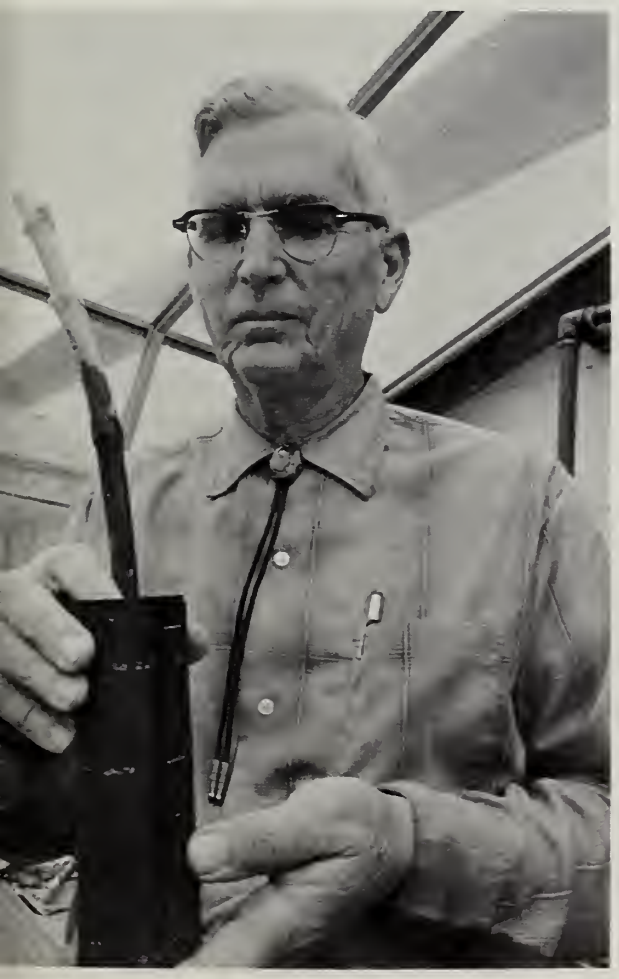
After callusing, the scions and unions were dipped in ordinary household paraffin to prevent the scions from drying out. They were then individually planted in soil-filled tubes made from pieces of roofing paper that had been rolled and then stapled together.

The waxed union was positioned above the soil line where it remained dry, thus preventing scion roots from forming. Roots often grow from the bottom portion of the scion when the vines are planted in rows and the unions covered with soil, as is the customary practice. Scion roots, which must always be removed, often result in the loss of many tender grafts.

Placed in a protected area, the planted bench grafts began growth in their paper tubes as leaves and roots developed and the graft unions knit together. In early spring they were transplanted into the vineyard as established vines and irrigated frequently to encourage rapid growth. Of the 322 vines, 302 survived—94 percent.

Although only about 20 percent of California vineyards are on rootstocks today, the need for pest-resistant stocks is increasing as the old, low-producing vineyards with their high soil-pest populations are being replanted. ▪

Dr. Weinberger carries a graft planted in a soil-filled growing tube made of roofing paper where it will remain until planted in the field (371X217–44).



Spacing cotton for high yields

HOW MANY PLANTS to put on an acre and how far apart to put them are vital questions for today's profit-squeezed cotton growers. The first question turned out to be the important one in studies with upland cotton in Georgia.

Cotton producers are looking for planting patterns that will give maximum yields while permitting efficient use of mechanical harvesters.

Attacking the problem, ARS agronomists Barney S. Hawkins and Hugh A. Peacock evaluated different spacing patterns at Experiment, Ga., in cooperation with the University of Georgia College of Agriculture Experiment Stations. They varied the number of plants per hill, the within-row spacing between hills, and the number of plants per acre.

The test plots were planted in rows 24 feet long, with hills spaced 8, 16, and 24 inches apart. The distance between rows was kept at 40 inches. The number of plants per hill was varied from two to five. This resulted in 12 different spacing patterns, with plant populations ranging from 13,000 to 97,500 per acre.

The two highest yields, averaged over 3 years, came from populations of 39,000 and 48,750 plants per acre. These populations represent quite different spacing patterns—two plants per hill with hills 8 inches apart, and five plants per hill with hills 16 inches apart.

Yields dropped rapidly as the plant population decreased below 39,000 plants per acre. With increased density above 48,750 per acre, yields also declined, but more gradually. These results indicate that an adequate plant population is important for high yields.

Changes in spacing arrangements can lead to differences in fruit, fiber, and seed characteristics. Some variations in such characteristics were observed in the Georgia studies.

The lowest plant populations produced the largest bolls and the highest lint percent. Lint percent is the weight of the lint as a percentage of the weight of the seed cotton. The large bolls and high lint percent, however, didn't make up for the yield lost by sparser planting.

Plants in hills spaced farther apart produced cotton with stronger fibers, but fiber strength wasn't affected by the number of plants per hill.

The distance between hills and the number of plants per hill had no consistent effect on the length of fibers, but a pattern of three plants per hill and 16 inches between hills gave the longest fibers.

The spacing variations did not affect the fineness of fibers or the size of the seeds. ▪

USDA Presents Awards

Dr. Neil Stuart (1269A291–7).

Dr. Edgar Hartwig (471X387–8).

FOR THEIR OUTSTANDING achievements, 11 individuals and two groups of ARS employees recently received Distinguished and Superior Service Awards.

Secretary of Agriculture Clifford M. Hardin presented the awards at UDA's 25th annual awards ceremony held May 18 in Washington, D.C.

for Distinguished Service

Edgar E. Hartwig, *Plant Science,* for research in soybean breeding and production that has been a major factor in the growth of the soybean industry in the South.

Neil W. Stuart, *Plant Science,* for his achievements in the improvement of florist and nursery crops, and for effective national and international leadership in plant physiology and horticulture.

Federal Hog Cholera Emergency Team, *Animal Health,* for excellence, creative leadership, dedication, and sacrifice in averting a major disease epidemic.

for Superior Service

Elexis C. Bashaw, *Plant Science,* for developing the first artificially produced crop variety, Higgins buffelgrass, that reproduces by seed but without fertilization.

Leonard V. Covello and John W. Gore, *Personnel,* for developing a training course for supervisors which has set new standards for effectiveness and economy.

David J. Doran, *Veterinary Sciences,* for advancing research on coccidia, protozoan parasites which cause heavy annual losses to the poultry industry.

Howard R. Haise and Robert W. Pearson, *Soil and Water Conservation,* for research leadership in the recognition and solution of problems in soil fertility and management in the Southeast, Puerto Rico, and Latin America.

Nelson E. Jodon, *Plant Science,* for developing superior rice varieties and for internationally recognized leadership in the field of rice breeding and genetics.

Joseph F. Silbaugh, *Information,* for innovations in communicating the benefits of agricultural research to consumers and professional groups.

Marvin P. Thompson, *Eastern Marketing and Nutrition,* for research resulting in the elucidation of the genetic complexity of milk proteins and their relations to the processing of engineered dairy foods.

Fred H. Tschirley, *Plant Science,* for research on the control of tropical vegetation and the ecological consequences of defoliation in Vietnam.

Gypsy Moth Project, *Entomology,* for the discovery and synthesis of a sex attractant for the gypsy moth, a serious forest pest of the Eastern United States. ▪

AGRISEARCH NOTES

Clipped peppers transport well

Pepper transplants grown in the South performed as well as or better after clipping than nonclipped plants.

Approximately 200 million pepper plants are grown in southern Georgia each spring for shipping and transplanting in northern pepper-producing areas.

Since these plants are not clipped before harvesting and shipping, their size is large. Using clipped plants would reduce plant breakage and would increase the number of plants per crate. Thus, packing and shipping costs would be reduced.

Performance studies of clipped plants versus unclipped were undertaken by soil scientist Casimir A. Jaworski and plant pathologist Raymon E. Webb, both of ARS, for a 3-year period from 1968 to 1970.

A modified rotary lawn mower was used in clipping the upper leaves and top flower clusters on two peppper varieties, Keystone Resistant Giant and Hungarian Yellow Wax Hot. This left each plant with three to five side buds for new growth.

After being shipped and transplanted in Beltsville, Md., the clipped plants yielded at least as well as the nonclipped plants. And those clipped 12 days before transplant harvest produced almost 3 tons more usable fruit per acre than the nonclipped. The studies also showed that clipping permitted marketable-size transplants to be held in the field up to 2 weeks before shipping if unfavorable weather prevailed in the North.

The researchers warn, however, that clipping could cause major disease problems by transferring pathogens from plant to plant. Therefore, clipping should be used only in fields free of major diseases.

Putting the squeeze on plant cells

As flat as a pancake is fine . . . for pancakes. But it isn't nearly flat enough for counting and analyzing plant chromosomes, an important factor in breeding research and genetic studies.

At Tifton, Ga., ARS geneticist Jerrel B. Powell, in cooperation with the Georgia Coastal Plain Experiment Station, has discovered a technique that allows plant geneticists to make the high-quality chromosome preparations long available only to animal geneticists. Unlike animal cells, plant cells have cellulose walls that resist expansion, flattening, and separation. This is especially true of many forage grasses with small cells and numerous small chromosomes.

The key to the new technique is an ordinary laboratory pellet press that can evenly apply up to 2,000 pounds of force without breaking glass cover slips or slides.

"This method of flattening plant cells," says Dr. Powell, "has enabled us to examine the form and structure of individual chromosomes in bermudagrass having 36 chromosomes. Previously we had difficulty even making accurate counts with certainty."

The new method also permits more cells to be photographed in a single focal plane. This reduces the number of slide preparations needed to obtain suitable specimens.

Dr. Powell prepares slide and coverslip as usual, taking care to remove sand or dirt, and places them on base plate of the press. A folded piece of absorbent paper and a number 4 rubber stopper are placed over the coverslip and alined with the press ram. Lever is depressed to flatten plant smear and kept down until manually released (PN–1960).

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AGRISEARCH NOTES

Test diagnoses horse disease

A recently developed diagnostic technique may reduce and control the spread of equine infectious anemia, a contagious virus disease of horses and mules.

ARS veterinary scientists at the National Animal Disease Laboratory, Ames, Iowa, evaluated the immunodiffusion test for the diagnosis of equine infectious anemia. Current evidence indicates that this test will detect apparently healthy survivors of the disease as well as infected animals that are clinically sick.

Detecting the survivors is important because most of them are carriers for life and constitute a continual threat of spreading the disease. Results of initial evaluations indicate a high degree of reliability for the test.

The immunodiffusion test was developed by LeRoy Coggins, a former ARS scientist. The evaluations were conducted by ARS research veterinarians James E. Pearson and Lawrence O. Mott, and bio-lab technician C. Stanley Becvar.

Make potato hoppers mobile

A new way to transport potatoes from storage piles to grading lines may increase operating efficiency to meet the demands of higher handling rates and larger storage needs.

ARS agricultural engineer Paul H. Orr, East Grand Forks, Minn., proposes using two "fully mobile" hoppers in conjunction with small, highly maneuverable agricultural loaders or bulk scoops to transport the potatoes. One hopper would be filled at the pile while the other is unloaded at the line.

As presently used, the bulk scoops transport single scoopfuls of potatoes from the piles to stationary hoppers at the grading line. Several scoopfuls are needed to fill one hopper. Mr. Orr's studies show that the travel time involved is costly in terms of the system's output. In some storages, a difference of a few feet of hauling distance can add up to several hundred miles of extra travel for the bulk scoop.

With the new method, the bulk scoop would be operating almost continuously at short distances—greatly increasing efficiency. When the scoop is used to move a hopper from the pile to the line, several scoopfuls are carried in the hopper in one trip.

An alternate possibility for Mr. Orr's proposal is to adapt hopper-bottom bulk trucks for use as mobile hoppers. This would provide off-season use for the equipment.

Wind can spread nematodes

Wind plays an important part in distributing soil nematodes, including many that are plant parasites.

This was shown in studies of dust samples collected after dust storms near Lubbock, Tex., by ARS nematologist Calvin C. Orr and agricultural meteorologist O. H. Newton of the Environmental Science Services Administration. The Texas Agricultural Experiment Station, College Station, cooperated in the research.

The dust traps were 30-gallon barrels which pivoted in the wind, with inlets about 6½ feet above the ground. Dust samples were collected in glass jars or plastic bags at the bottoms of the barrels. In the laboratory, the samples were moistened and allowed to incubate at room temperature for 4 weeks before the nematodes were separated from the samples. Incubation was necessary because the wind had transported the nematodes as eggs and larvae.

From 12 samples, including two from a drift of wind-blown soil, 28 genera of nematodes were identified. Half of the genera were plant-parasitic forms.

In west Texas, several hundred thousand acres of sandy land are infested with root-knot nematodes. During a dust storm, it is not unusual for 10 pounds of sediment containing 2,000 or more nematode eggs and larvae to pass over 10 feet of land surface per hour. This widespread deposition of nematode-laden dust could explain a rapid and extensive infestation of root-knot nematodes.

U.S. GOVERNMENT PRINTING OFFICE:1971 O—422-730